

WHAT IS CLAIMED IS:

1. An image displaying apparatus comprising:  
a first plate including at least an electron beam  
source;

5 a second plate including an anode to which an  
electric potential for accelerating an electron beam  
from the electron beam source is applied, and a  
potential regulating electrode to which a predetermined  
electric potential lower than that of the anode is  
10 applied, the potential regulating electrode being  
situated at an outside of the anode; and

a spacing member provided between said first and  
second plates, said spacing member contacting both of  
the anode and the potential regulating electrode, said  
15 spacing member including an electrode contacting or  
being disposed close to the potential regulating  
electrode thereby electrically connected with the  
potential regulating electrode.

20 2. An image displaying apparatus according to  
claim 1, wherein said spacing member further includes  
an electrode contacting or being disposed close to the  
anode thereby electrically connected with the anode.

25 3. An image displaying apparatus according to  
claim 1, wherein said spacing member further includes  
an electrode contacting or being disposed close to the

10002291-120504

electrode disposed on said first plate side to be electrically connected with the electrode.

4. An image displaying apparatus according to claim 1, wherein an earth potential is supplied to the potential regulating electrode.

5. An image displaying apparatus according to claim 1, wherein an electric potential equal to a lowest electric potential among electric potentials supplied to the electron beam source or more.

6. An image displaying apparatus according to claim 1, wherein:

the anode include an image area in which a phosphor emitting light by being irradiated with electrons from the electron beam source; and

when an averaged height of a portion of the anode contacting the spacing member on an outside of the image area is indicated by  $D_a$ , and a surface roughness of the portion is indicated by  $R_a$ , and an averaged height of a portion of the potential regulating electrode contacting the spacing member is indicated by  $D_b$ , and a surface roughness of the portion is indicated by  $R_b$ , the averaged heights  $D_a$  and  $D_b$  and the surface roughnesses  $R_a$  and  $R_b$  meet following conditions:

$$|D_a - D_b| \leq 2R_a, \text{ and } |D_a - D_b| \leq 2R_b.$$

10002291-120504

7. An image displaying apparatus according to claim 1, wherein at least an area of said second plate between the anode and the potential regulating electrode has a sheet resistance within a range of  $10^7$  ( $\Omega/\square$ ) to  $10^{14}$  ( $\Omega/\square$ ).

8. An image displaying apparatus according to claim 1, wherein a high resistance membrane is formed at least in an area of said second plate between the anode and the potential regulating electrode.

9. An image displaying apparatus according to claim 1, wherein an area having a sheet resistance within a range of  $10^7$  ( $\Omega/\square$ ) to  $10^{14}$  ( $\Omega/\square$ ) exists on the spacing member at least between a portion thereof contacting the anode and a portion thereof contacting the potential regulating electrode.

10. An image displaying apparatus according to claim 1, wherein a high resistance membrane is formed on the spacing member at least between a portion thereof contacting the anode and a portion thereof contacting the potential regulating electrode.

11. An image displaying apparatus according to claim 1, wherein:

the spacing member includes an electrode

10002291 120501

contacting or being disposed close to the anode thereby  
electrically coupled with the anode and an electrode  
contacting or being disposed close to the potential  
regulating electrode thereby electrically connected  
5 with the potential regulating electrode; and

an area between the electrode contacting or being  
disposed close to the anode thereby electrically  
coupled with the anode and the electrode contacting or  
being disposed close to the potential regulating  
10 electrode thereby electrically connected with the  
potential regulating electrode has a sheet resistance  
within a range of  $10^7$  ( $\Omega/\square$ ) to  $10^{14}$  ( $\Omega/\square$ ).

12. An image displaying apparatus according to  
15 claim 1, wherein the spacing member includes an  
electrode contacting or being disposed close to the  
anode thereby electrically coupled with the anode, an  
electrode contacting or being disposed close to the  
potential regulating electrode thereby electrically  
20 connected with the potential regulating electrode and a  
high resistance membrane contacting or being disposed  
close to each of the electrode contacting or being  
disposed close to the anode thereby electrically  
coupled with the anode and the electrode contacting or  
25 being disposed close to the potential regulating  
electrode thereby electrically connected with the  
potential regulating electrode thereby electrically

10002291.120501

connected with them.

13. An image displaying apparatus according to claim 1, wherein:

5           the spacing member includes an electrode contacting or being disposed close to the anode thereby electrically coupled with the anode and an electrode contacting or being disposed close to the potential regulating electrode thereby electrically connected  
10 with the potential regulating electrode; and  
          an interval between the electrode contacting or being disposed close to the anode thereby electrically coupled with the anode and the electrode contacting or being disposed close to the potential regulating  
15 electrode thereby electrically connected with the potential regulating electrode is substantially the same as an interval between the anode and the potential regulating electrode.

20           14. An image displaying apparatus according to claim 1, wherein an interval between a projective position of an extreme point on the anode side of the potential regulating electrode to the spacing member and a position of an extreme point on the anode side of  
25 an electrode contacting or being disposed close to the potential regulating electrode of the spacing member thereby electrically connected with the potential

10002291-120501

regulating electrode is ten percent or less of an interval between the potential regulating electrode and the anode.

5           15. An image displaying apparatus according to claim 1, wherein:

the spacing member includes an electrode contacting or being disposed close to the anode thereby electrically connected with the anode; and

10           an interval between a projective position of an extreme point on the potential regulating electrode side of the anode to the spacing member and a position of an extreme point on the potential regulating electrode side of the electrode of the spacing member,  
15           the electrode contacting or being disposed close to the anode thereby electrically connected with the anode, is ten percent or less of an interval between the potential regulating electrode and the anode.

20           16. An image displaying apparatus according to claim 1, wherein at least a part of said second plate and the spacing member contacts between the potential regulating electrode and the anode of said second plate.

25           17. An image displaying apparatus according to claim 1, wherein a structure contacting the spacing member is provided in an area between the anode and the

10002291-120504

potential regulating electrode of said second plate.

10002291.120501  
18. An image displaying apparatus according to claim 17, wherein, when an averaged height of said  
5 structure contacting the spacing member of said second plate is indicated by  $D_c$ , and an averaged height of a portion of the anode contacting the spacing member is indicated by  $D_a$ , and a surface roughness of the portion is indicated by  $R_a$ , and an averaged height of a portion  
10 of the potential regulating electrode contacting the spacing member is indicated by  $D_b$ , and a surface roughness of the portion is indicated by  $R_b$ , the averaged heights  $D_c$ ,  $D_a$  and  $D_b$  and the surface roughnesses  $R_a$  and  $R_b$  meet at least one of following  
15 formulae:

$$|D_a - D_c| \leq 2R_a, \quad |D_b - D_c| \leq 2R_b.$$

19. An image displaying apparatus according to claim 17, wherein said structure contacting the spacing  
20 member of said second plate is composed of a high resistance material.

20. An image displaying apparatus according to claim 17, wherein a high resistance membrane having a  
25 volume resistivity lower than that of said structure is formed on a surface of said structure contacting the spacing member of said second plate.

21. An image displaying apparatus according to claim 1, wherein the spacing member has a structure for contacting an area between the anode and the potential regulating electrode of said second plate.

5

22. An image displaying apparatus according to claim 21, wherein said structure of the spacing member for contacting the area between the anode and the potential regulating electrode of said second plate is a projecting configuration.

10

23. An image displaying apparatus according to claim 1, wherein the spacing member includes a high resistance membrane.

15

24. An image displaying apparatus according to claim 23, wherein a sheet resistance of the high resistance membranes of the spacing member is within a range of  $1 \times 10^7$  ( $\Omega/\square$ ) to  $1 \times 10^{14}$  ( $\Omega/\square$ ).

20

25. An image displaying apparatus according to claim 1, wherein the electron beam source provided on said first plate is disposed in a matrix.

25

26. An image displaying apparatus according to claim 1, wherein the electron beam source is composed of surface conduction electron-emitting devices.